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DEPARTMENT OF PUBLIC HEALTH

# SUBMISSION TO THE ROYAL SOCIETY OF CANADA, COMMISSION ON LEAD IN THE ENVIRONMENT

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## SUMMARY

The Toronto Department of Public Health has been extensively involved in assessing and attempting to reduce childhood exposure to lead around secondary lead smelters. Such experience, plus review of the literature on other lead matters, suggests five subject areas for recommendations to the Commission on Lead in the Environment: laboratory quality assurance, soil lead, paint lead, gas lead and occupational exposure to lead.

## LABORATORY QUALITY ASSURANCE

**Recommendation 1**

That all publicly funded blood lead analysis in Canada be performed only at laboratories participating in a national quality assurance program for blood lead analysis.

## SOIL LEAD

**Recommendation 2**

That soil containing lead in excess of 1,000 ppm be replaced at public expense if the following four conditions are met:

1) Children aged 0-5 are regularly exposed to the soil.

2) A representative sample of the children indicates a mean blood lead higher than the comparable Ontario Blood Lead Study results or other acceptable survey results.

3) The soil lead will not quickly re-accumulate.

4) Provincial/municipal cost sharing is arranged.

## PAINT LEAD

**Recommendation 3**

That all public health home visits for assessing child exposure to possible lead sources should include portable x-ray fluorescence (at the house) or wet chemical analysis (at a laboratory) for all peeling, etc. interior and exterior paint surfaces, unless the residence was constructed after 1975.

**Recommendation 4**

That all paint sold in Canada have less than 1,000 ppm lead unless specifically exempted due to an application which will not be hazardous to young children.

**Recommendation 5**

That a national public awareness campaign be conducted to include the following components:

1) If you have any peeling paint which was purchased before 1976, and preschool children, there may be a risk to your children.

2) Remove the unsound paint by a recommended technique.

3) Repaint, if desired, with paint containing less than 1,000 ppm lead.

Strategies for disseminating this information could include health department letters to all residents in older neighbourhoods, paint store brochures, mall displays in selected areas, etc.

## GAS LEAD

Recommendation 6

That the federal government reduce allowable gas lead to 0 grams/litre as quickly as industrial conversion will practically allow.

Recommendation 7

That additives such as M.M.T. not be used in general until proven harmless.

Recommendation 8

That current lead additive workers be offered employment security with job retraining as necessary.

Recommendation 9

That the present federal tax on gas be variable so as to equalize prices for leaded and unleaded gas of comparable octane, and hence remove the economic incentive to misfuel while making the polluter pay.

## OCCUPATIONAL EXPOSURE TO LEAD

Recommendation 10

That the Commission urge provinces to adopt occupational exposure limits of 25 ug/dl or less for women capable of bearing children, and 40 ug/dl for all other persons.

## INTRODUCTION

The Toronto Department of Public Health has been extensively involved in assessing and attempting to reduce childhood exposure to lead around secondary lead smelters. Such experience, plus review of the literature on other lead matters, suggests five subject areas for recommendations to the Commission on Lead in the Environment: laboratory quality assurance, soil lead, paint lead, gas lead and occupational exposure to lead.

## LABORATORY QUALITY ASSURANCE

At the Health Effects (of lead) Workshop convened by the Commission in Ottawa, March 29 - 30, 1985, Drs. Farant of Montreal and Hammond of Cincinnati reviewed the need for a suitable "gold" standard by which to validate blood lead analysis methods and the need for more accurate results within and among laboratories. Otherwise, various surveys in Canada are not easily comparable and agencies conducting serial screening programs in local populations will probably find it difficult to differentiate true trends in blood lead levels from laboratory variation.

Recommendation 1

That all publicly funded blood lead analysis in Canada be performed only at laboratories participating in a national quality assurance program for blood lead analysis.

## SOIL LEAD

The Department of Public Health has participated in several blood lead surveys around Canada Metal Company (South Riverdale) and Toronto Refiners and Smelters Limited (Bathurst-Niagara)[1,2,3,4] since the early 1970's. The problem has been better defined around the Canada Metal Company and will be reviewed briefly.

In the early 1970's lead contamination of the environment was first thought to pose a potential health hazard in Toronto. The Ministry of the Environment conducted surveys around 45 suspected lead sources in Ontario, 1972-3, and found the degree and extent of lead contamination of soil and vegetation in the vicinity of Canada Metal Company to be the highest in the province. Subsequent blood lead surveys summarized in Table 1 show that blood lead levels have decreased. The 1975 Report of the Lead Data Analysis Task Force[5] demonstrated a significant (1% level) increase in child blood lead levels when the estimated residential soil lead level exceeded 1,000 ppm. This held for the Canada Metal Company area alone and for all Toronto smelters combined. A similar relationship has been shown more recently in Dallas, Texas with a 0.4 correlation between soil and child blood lead levels[6].

In 1977, the top 15 centimetres of soil were replaced at 48 South Riverdale residential properties containing over 2,600 ppm soil lead.

Continued public concern led to a 1982 non-random (volunteer) testing of 2,260 persons (all ages), generally living within 1,500 metres of the plant [1]. Children aged 0-5 were found to have a significantly higher blood lead than those aged 6+. A concurrent survey of Grade 1 students living within 1,500 metres of the plant, reported by Stiasney[1], showed no significant difference in blood lead compared to a west Toronto socio-demographically similar area or a north Toronto dissimilar area. Thus, 1983 and 1984 screening programs were targetted for children aged 0-5 living in a designated area in South Riverdale. This area equalled the Ontario Ministry of the Environment computer generated isopleth of the area with soil lead likely exceeding 1,000 ppm, plus additional residences so as to form squared off blocks (Appendix I of Reference 3). The 1984 testing program reached 62% of the estimated target population (350) and found a geometric mean blood lead of 14.6 ug/dl (capillary specimen, atomic absorption spectrophotometry by the Ontario Ministry of Health laboratory). 18.5% of values were 20+ ug/dl and 6% were 25+ ug/dl. Two children were confirmed to have lead toxicity by the 1985 United States Centers for Disease Control definitions[7]. Follow-up home visits by a public health nurse and a public health inspector for 92% of the children with a screening blood lead of 20+ ug/dl (Table X of Reference 3) identified play exposure to bare soil, household dust and peeling paint to be common.

Due to extensive emission control measures at the Canada Metal Company plant, the neighbourhood monthly geometric mean air lead levels (monitor 31064) have been under 1 ug/M$^3$ since mid-1979 (Figure 2 of Reference 8).

During the summer of 1985 the Ontario Ministry of the Environment is conducting additional soil lead testing within the 1,000 ppm isopleth, in order to determine the proportion of approximately 400 residential properties, boulevards, etc. which have soil lead in excess of 1,000 ppm. In addition, this department plans to compare South Riverdale blood lead data with Ontario Blood Lead Study data.

**Recommendation 2**

That soil containing lead in excess of 1,000 ppm be replaced at public expense if the following four conditions are met:

1) Children aged 0-5 are regularly exposed to the soil.

2) A representative sample of the children indicates a mean blood lead higher than the comparable Ontario Blood Lead Study results or other acceptable survey results.

3) The soil lead will not quickly re-accumulate.

4) Provincial/municipal cost sharing is arranged.

PAINT LEAD

The 1985 Centers for Disease Control statement on prevention of lead poisoning in young children' asserts that "lead-based paint continues to be a major source of high-dose lead exposure and symptomatic lead poisoning for children in the United States"'. In Canada, the situation is unclear. Canada has allowed 5,000 ppm lead in paint since 1976, while the U.S. reduced the allowance to 600 ppm in 1977. Considering the above noted relationship of soil lead exceeding 1,000 ppm and rising child blood lead, paint lead of 5,000 ppm can be hazardous if sufficient volume is ingested. For example, old paint peeling from porches contaminates soil where toddlers may play and ingest such soil in the course of normal hand-mouth activities.

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That all public health home visits for assessing child exposure to possible lead sources should include portable x-ray fluorescence (at the house) or wet chemical analysis (at a laboratory) for all peeling, etc. interior and exterior paint surfaces, unless the residence was constructed after 1975.

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That all paint sold in Canada have less than 1,000 ppm lead unless specifically exempted due to an application which will not be hazardous to young children.

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Strategies for disseminating this information could include health department letters to all residents in older neighbourhoods, paint store brochures, mall displays in selected areas, etc.

## GAS LEAD

In 1925 the United States Surgeon General convened a conference of experts from business, labour and public health to assess the tetraethyl lead situation following its commercial introduction in 1923 and subsequent reports of acute lead poisoning and deaths among workers at various lead additive facilities. The manufacturers cited three central arguments for continued use of the lead additive: 1) essential to the industrial progress of the United States, 2) any innovation entails certain risks, and 3) lead worker illness and deaths are from careless handling of the chemical[10].

A belated response to points 1 and 2 for the 1985 Canadian situation is in order:

1) The automotive industry can thrive with unleaded gas (56% of Ontario gas sales in 1984). In order to meet the hydrocarbon, nitrogen oxides and carbon monoxide automobile emission standards which go into effect in 1987[11], catalytic converters will be used extensively and will require unleaded gas for proper functioning.

   Misfuelling with leaded gas (estimated 7% rate in Ontario, 1984) is likely to continue or increase until there is no economic advantage. Adequate point of sale policing by self-serve gas station attendants or government inspectors to prevent misfuelling is impractical. Present federal taxes are greater for unleaded gas. Thus, the user of leaded gas saves while polluting and the user of unleaded gas pays extra tax to avoid pollution.

   There are two issues more essential for the "progress" of refineries and lead additive producers. First, it should be more efficient for refineries to make the changes necessary for zero lead gas production as one major project rather than change every few years in a slow descent to a zero level. Second, lead additive workers require employment security and priority attention for job retraining.

2) While any innovation entails certain risks, the risk of lead in the environment is increasingly unacceptable. There is no proven value for any lead in the human body. There is excellent evidence that blood lead of 20 ug/dl and less can cause physiological and biochemical abnormalities, fair evidence that blood levels of 20+ ug/dl can cause neurobehavioural problems in young children, and some evidence

that levels of 20+ ug/dl can cause congenital anomalies. No one who has carefully reviewed the literature should be comfortable for children aged 0-5 to have a sustained blood lead of 20+ ug/dl. It is prudent to take action to reduce the proportion of children with sustained blood lead in that range. Annual blood lead screening and follow-up of the entire pre-school population to find the perhaps 3-4% with a blood lead of 20+ ug/dl would be very expensive on a national basis (at least $20 per child). The more efficient way to decrease the average child blood lead, and hence the proportion of children exceeding 20 ug/dl, is to remove all lead from gas.

In retrospect, it was a mistake to add lead to gas, although the motivations for doing so are readily apparent and understandable. Other proposed and present additives for purposes of boosting octane (e.g. M.M.T.) should not be used in general until proven harmless.

Recommendation 6

That the federal government reduce allowable gas lead to 0 grams/litre as fast as industrial conversion will practically allow.

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That the present federal tax on gas be variable so as to equalize prices for leaded and unleaded gas of comparable octane, and hence remove the economic incentive to misfuel while making the polluter pay.

## OCCUPATIONAL EXPOSURE TO LEAD

This is a matter of provincial jurisdiction. The current Ontario occupational exposure limit for women capable of bearing children is 40 ug/dl while for others it is 70 ug/dl. As the rationale for the 40 figure is to safeguard a developing fetus due to lead transfer across the placenta, a limit of 20 or 25 ug/dl would be more logical. In view of lead-induced health effects in adults at

40 ug/dl or less*, a general occupational limit of 40 ug/dl or less for all other persons is indicated.

Recommendation 10

That the Commission urge provinces to adopt occupational exposure limits of 25 ug/dl or less for women capable of bearing children, and 40 ug/dl for all other persons.

TABLE 1

LEAD SURVEYS IN SOUTH RIVERDALE AREA OF TORONTO SURROUNDING THE CANADA METAL COMPANY LIMITED

| INVESTIGATOR | TIME | PERSONS SURVEYED | AGES | MEAN BLOOD LEAD (UG/DL) | ≥20 UG/DL | ≥25 UG/DL | ≥30 UG/DL | ≥40 UG/DL |
|---|---|---|---|---|---|---|---|---|
| Envir. Studies Univ. of Toronto | May-Dec. 1973 | 1041 (within 300 metres of company) | 0-14 | 28 arith. mean | | | | 13 |
| More Working Group | Oct. 1973 Jan. 1974 | 1633 | All | | | | | |
| | | | 0-3 | | | | | 13 |
| | | | 0-4 | | | | | 6.5 |
| DPH (City of Toronto Dept. of Public Health) | Summer 1974 | 478 | 0-4 | | | | 20 | |
| | | 708 | 5-9 | | | | 16 | |
| DPH | Aug. 1976 | 222 | | | | | 3.5 | |
| | | 32 | 0-4 | | | | 10 | |
| | | 39 | 5-9 | | | | 2.5 | |
| DPH | June 1977 | 74 | | 14.6 geom. mean | | | 10 | |
| | | 12 | 0-4 | | | | 8 | |
| | | 20 | 5-9 | | | | 5 | |
| DPH | Oct. 1980 | 112 | | 7.1 geom. mean | | | 0 | |
| | | 25 | 0-4 | | | | 0 | |
| | | 29 | 5-9 | | | | 0 | |
| DPH | Oct. 1981 | 141 | | | | | ≤1 | |
| | | 24 | 0-3 | | | | ≤1 | |
| | | 213 | 4-9 | | | | | |
| DPH | Sept. 1982 | 135 (within designated area) | 0-5 | 12.9 geom. mean | 13.3 | 3 | | |
| DPH | Sept. 1983 | 70 (within designated area) | 0-5 | 15.1 geom. mean | 18.6 | 4.1 | | |
| DPH | Sept. 1984 | 214 (within designated area) | 0-5 | 14.4 geom. mean | 18.5 | 6.0 | | |

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